

WHAT IS CLAIMED IS:

1. An unspecified bit rate (UBR) traffic control apparatus, comprising:
 - an egress subscriber terminal that repeatedly monitors cell congestion state and traffic state of cells output from a switch terminal, generates UBR bandwidth information corresponding thereto, and feeds-back the UBR bandwidth information; and
 - an ingress subscriber terminal that outputs UBR cells to the switch terminal according to the fed-back UBR bandwidth information.

2. The UBR traffic control apparatus according to claim 1, wherein the egress subscriber terminal comprises:
 - a congestion information extraction unit that extracts congestion information indicating whether there is cell congestion in a relevant cell;
 - a load measuring unit that measures traffic load of the relevant cell and outputs corresponding traffic load information;
 - an egress buffer unit that checks whether a prescribed buffer threshold value of the relevant cell has been exceeded and outputs corresponding traffic state information; and
 - a traffic state determination unit that determines UBR bandwidth based upon the congestion information, the traffic state information and the traffic load information and feeds-back the UBR bandwidth information to the ingress subscriber terminal.

3. The UBR traffic control apparatus according to claim 2, wherein the congestion information extraction unit extracts the congestion information by monitoring a congestion indicator field value of the relevant cell.

4. The UBR traffic control apparatus according to claim 2, wherein the traffic state determination unit reduces the UBR bandwidth to UBR available bandwidth when the congestion information indicates that there is corresponding cell congestion and when the traffic state information indicates that the prescribed buffer threshold value of the relevant cell has been exceeded.

5. The UBR traffic control apparatus according to claim 2, wherein the traffic state determination unit increases the UBR bandwidth by a first prescribed rate or a second prescribed rate that is smaller than first prescribed rate according to the traffic load confirmed through the traffic load information when the congestion information indicates that there is corresponding cell congestion and when the traffic state information indicates that the prescribed buffer threshold value has not been exceeded.

6. The UBR traffic control apparatus according to claim 5, wherein the traffic state determination unit increases the UBR bandwidth by the first prescribed rate or by a second prescribed rate that is smaller than the first prescribed rate according to the traffic load confirmed through the traffic load information when the congestion information indicates that there has been no congestion.

7. The UBR traffic control apparatus according to claim 6, wherein the traffic state determination unit increases the UBR bandwidth by applying said first prescribed rate when the traffic load is not greater than a prescribed lower load value.

8. The UBR traffic control apparatus according to claim 6, wherein the traffic state determination unit increases the UBR bandwidth by applying said second prescribed rate when the traffic load is greater than a prescribed lower load value and is not greater than a prescribed upper load value.

9. The UBR traffic control apparatus according to claim 6, wherein the traffic state determination unit maintains the UBR bandwidth when the traffic load exceeds a prescribed upper load value.

10. A UBR traffic control apparatus comprising:
an egress subscriber terminal that determines UBR bandwidth periodically according to cell congestion experience and traffic state of cells output from a switch terminal, wherein the egress terminal determines subscriber boards that are to be controlled when the UBR bandwidth changes based upon cell count information for each subscriber board of the subscriber boards and feeds-back the UBR bandwidth information to the determined subscriber boards to be controlled; and

an ingress subscriber terminal that outputs UBR cells to the switch terminal according to the fed-back UBR bandwidth information.

11. The UBR traffic control apparatus according to claim 10, wherein the egress subscriber terminal comprises:

a congestion information extraction unit that extracts congestion information indicating whether there is cell congestion experience in a relevant cell;

a load measuring unit that measures traffic load of the relevant cell and outputs corresponding traffic load information;

a user cell extraction unit that counts user cells for said each subscriber board and outputs the cell count information for each relevant subscriber board;

an egress buffer unit that checks whether UBR user cells of said user cells exceed a pre-determined buffer threshold value and outputs corresponding traffic state information;

a traffic state determination unit that increases, decreases or maintains the UBR bandwidth based upon the congestion information, the traffic state information and the traffic load information, and wherein when the UBR bandwidth is increased or decreased, the traffic state determination unit determines subscriber boards that are to be controlled by using the user cell count information for said each subscriber board, and outputs the increased or decreased UBR bandwidth information and information on the subscriber boards to be controlled; and

a control cell generation unit that generates control cells using the UBR bandwidth information and the information on subscriber boards to be controlled and feeds-back the

determined UBR bandwidth information to the ingress subscriber terminals of the subscriber boards to be controlled through the generated control cells.

12. The UBR traffic control apparatus according to claim 11, wherein the congestion information extraction unit extracts the congestion information by monitoring a congestion indicator field value of the relevant cell.

13. The UBR traffic control apparatus according to claim 11, wherein the user cell extraction unit periodically extracts user cells, counts cells for each subscriber board by using source information included in the extracted cells, and wherein the user cell extraction unit outputs the cell count information for said each subscriber board to the traffic state determination unit when a current period ends.

14. The UBR traffic control apparatus according to claim 11, wherein the traffic state determination unit reduces the UBR bandwidth to UBR available bandwidth and determines the subscriber board having a cell count value above a prescribed level as the subscriber board to be controlled when the congestion information indicates that there has been congestion and when the traffic state information indicates that the pre-determined buffer threshold value has been exceeded.

15. The UBR traffic control apparatus according to claim 11, wherein the traffic state determination unit increases UBR bandwidth by a first prescribed rate or a second

prescribed rate that is smaller than the first prescribed rate according to the traffic load confirmed through the traffic load information, and determines the subscriber board having the cell count value of 1 or more as the subscriber board to be controlled when the congestion information indicates that there has been congestion and the traffic state information indicates that the prescribed buffer threshold value has not been exceeded.

16. The UBR traffic control apparatus according to claim 11, wherein the traffic state determination unit increases the UBR bandwidth by a first prescribed rate or by a second prescribed rate that is smaller than the first prescribed rate according to the traffic load confirmed through the traffic load information and determines the subscriber board having the cell count value of 1 or more as the subscriber board to be controlled when the congestion information indicates that there has been no congestion.

17. The UBR traffic control apparatus according to claim 16, wherein the traffic state determination unit increases the UBR bandwidth by applying said first prescribed rate when the traffic load is not greater than the pre-determined lower load value.

18. The UBR traffic control apparatus according to or claim 16, wherein the traffic state determination unit increases the UBR bandwidth by applying said second prescribed rate when the traffic load is greater than the pre-determined lower load value and is not greater than the upper load value.

19. The UBR traffic control apparatus according to claim 16, wherein the traffic state determination unit maintains the current UBR bandwidth when the traffic load exceeds the pre-determined upper load value.

20. A UBR traffic control method comprising:
repeatedly determining, at an egress subscriber terminal, UBR bandwidth according to cell congestion experience and traffic state of cells output from a switch terminal and feeding-back the determined UBR bandwidth; and
outputting, at an ingress subscriber terminal, UBR cells to the switch terminal according to the fed-back UBR bandwidth information.

21. The UBR traffic control method according to claim 20, wherein the cell congestion state is confirmed through the value set in a congestion indicator field of the cell according to the occurrence of cell traffic congestion at the switch terminal.

22. The UBR traffic control method according to claim 20, wherein said determination of UBR bandwidth comprises:

confirming whether there is traffic congestion experience in a cell;
confirming whether a pre-determined buffer threshold value of the cell has been exceeded;
decreasing the UBR bandwidth to UBR available bandwidth when there has been traffic congestion and the buffer threshold value has been exceeded; and

increasing the UBR bandwidth according to the traffic load of the cell when there has been no traffic congestion in the cell or when there has been traffic congestion but the buffer threshold value has not been exceeded.

23. The UBR traffic control method according to claim 22, wherein said increasing of the UBR bandwidth comprises:

confirming the traffic load of the cell;

increasing the UBR bandwidth by applying first prescribed rate that is a certain specific bandwidth increase rate when the traffic load is not greater than the pre-determined minimum load value; and

increasing the UBR bandwidth by applying a second prescribed rate that is smaller than said first prescribed rate when the traffic load is greater than the minimum load value and is not greater than the pre-determined maximum load value.

24. The UBR traffic control method according to claim 23, further comprising maintaining of the current UBR bandwidth when the traffic load exceeds said maximum load value.

25. A UBR traffic control method comprising:

periodically counting, at an egress subscriber terminal, cells output from a switch terminal for each transmitting subscriber board;

determining UBR bandwidth according to congestion experience at the switch terminal and traffic state of said cells;

if the UBR bandwidth is increased or decreased, determining subscriber boards to be controlled by using the cell count information for each subscriber board;

feeding back said increased or decreased UBR bandwidth information to said subscriber boards to be controlled; and

outputting, at an ingress subscriber terminal of at least one of said subscriber boards to be controlled, UBR cells to the switch terminal according to the fed-back UBR bandwidth information.

26. The UBR traffic control method according to claim 25, wherein said counting of cells for each subscriber board comprises:

periodically extracting user cells from said cells output from the switch terminal and confirming source information of the relevant cells;

counting said user cells for each transmitting subscriber board by using said source information for a relevant period; and

initializing said count value for each subscriber board when the relevant period ends.

27. The UBR traffic control method according to claim 25, wherein said determination of UBR bandwidth comprises:

confirming whether there is traffic congestion experience in a cell;

confirming whether a pre-determined buffer threshold value of the cell has been exceeded;

decreasing the UBR bandwidth to UBR available bandwidth when there has been traffic congestion and the buffer threshold value has been exceeded; and

increasing the UBR bandwidth according to the traffic load of the cell when there has been no traffic congestion in the cell or if there has been traffic congestion but the buffer threshold value has not been exceeded.

28. The UBR traffic control method according to claim 27, wherein said increasing of the UBR bandwidth comprises:

confirming the traffic load of the cell;

increasing the UBR bandwidth by applying first prescribed rate that is a certain specific bandwidth increase rate when the traffic load is not greater than the pre-determined minimum load value;

increasing the UBR bandwidth by applying a second prescribed rate that is smaller than said first prescribed rate when the traffic load is greater than the minimum load value and is not greater than the pre-determined maximum load value; and

maintaining of the current UBR bandwidth if the traffic load exceeds said maximum load value and not feeding back the UBR bandwidth.

29. The UBR traffic control method according to claim 25, wherein said determination of subscriber boards to be controlled comprises:

confirming the cell count information for each subscriber board at the time of increasing or decreasing the UBR bandwidth; and

determining the subscriber board having the greatest cell count value as the subscriber board to be controlled when the UBR bandwidth is to be decreased and, determining subscriber boards having the cell count value of 1 or more as the subscriber boards to be controlled when the UBR bandwidth is to be increased.

30. The UBR traffic control method according to claim 25, wherein said feeding-back of the UBR bandwidth comprises:

generating control cells to be sent to said subscriber boards to be controlled; and

setting said UBR bandwidth information in the control cells and feeding them back to the ingress subscriber terminals of said subscriber boards to be controlled.